DOCUMENT RESUME

ED 040 073 SE 008 771

AUTHOR	Showalter, Victor M.
TITLE	Seminar in the Design and Development of Science Instructional Materials, A Summary Report.
INSTITUTION	Educational Research Council of America, Cleveland, Ohio.
PUB DATE	Feb 70
NOTE	76p.
EDRS PRICE	EDRS Price MF-$0.50 HC-$3.90
DESCRIPTORS	*Inservice Teacher Education, *Instructional Design, Instructional Improvement, *Program Descriptions, Program Evaluation, *Science Education, *Secondary School Teachers, Seminars, Teacher Education

ABSTRACT

Reported is an eight-week seminar conducted for ten junior high school science teachers. The purpose of the seminar was to develop attitudes to, and skills in, science teaching that would be consistent with the nature of science and the nature of the adolescent individual. The seminar was structured in four phases: development of science education theory, design and structuring of a science instructional unit, field trial of the instructional unit, and evaluation and revision of the instructional unit. Activities provided for each phase are described. Results of evaluation of the seminar by participants are reported. Recommendations are made relating to the provision and design of similar seminars. Appendices include a list of participants, a partial listing of references used in the seminar, two typical weekly schedules for phase one, a copy of the proposal for the seminar as submitted for funding, and participants' general reactions to the seminar. (EB)

SE 008 771

ED0 40073

SEMINAR IN THE DESIGN AND DEVELOPMENT OF SCIENCE INSTRUCTIONAL MATERIALS

SEMINAR IN THE DESIGN AND DEVELOPMENT OF SCIENCE INSTRUCTIONAL MATERIALS

A Summary Report

by

Victor M. Showalter

Sponsored by

The John Huntington Fund for Education

Educational Research Council of America

Cleveland, Ohio 44113

February 1970

TABLE OF CONTENTS

LIST OF TABLES

INTRODUCTION

The Seminar in Design and Development of Science Instructional Materials was conducted from June 16, 1969 through August 8, 1969 as the direct result of a grant for that purpose from the John Huntington Fund for Education to the Science Program of the Educational Research Council of America (ERC). This report is intended to summarize the purposes and actual conduct of the seminar along with an evaluation of the seminar and recommendations to the educational community based on the whole project.

The seminar represents a pioneering step in trying to contrive relevant postgraduate educational experiences for junior high school science teachers. The John Huntington Fund for Education and its chairman, the Honorable R. Henry Norweb, are to be commended for supporting the project from its inception. At the time there was nothing more concrete than a general purpose and some untried hunches on how the purposes might be achieved in some innovative ways.

The entire staff of ERC's Science Program contributed to the operation of the seminar. Some of these contributions were through formal presentations to the Seminar and others were in the form of informal

conversation with participants over coffee or in-the-hall conferences on a one-to-one basis. Dr. Ted Andrews, Dr. James Joseph Gallagher, Dr. Willard Korth, Mr. Paul Holobinko, Mr. Fred Rasmussen, Mr. Ray Bernabei, and Mr. Paul Jerdonek all made unique and valuable contributions to all phases of the project.

Many other individuals were instrumental in enabling the Field Trial portion (Phase III) of the Seminar to be successful. Among these were: Mr. Paul Smith and Mrs. Kathy Witstock (Westlake Schools), Mr. William Vejdovec (Lakewood Schools), Sister Jeanne Koma and Father John Garrity (Lexington Square Community Center), Mr. Wendell Atkinson (Council of Economic Opportunities in Greater Cleveland), Reverend Emmanuel Branch (Antioch Baptist Church), and Mr. Robert Pegues (Urban Education Department, Educational Research Council of America).

Several individuals from Cleveland State University contributed to the planning of the Seminar. Many of their suggestions were reflected in the content of the Seminar, especially in the Theory Development portion (Phase I). These individuals were: Dr. Ferris Anthony and Dr. Robert McNaughton (College of Education), and Dr. Bernard Hammermesh (Physics Department). Dean Sam Wiggins and Dr. Del Weber (College of Education) helped by managing administrative details and by acting as catalysts in enabling conventional graduate credit for an unconven-

tional seminar.

The cover of this report was designed by Mr. Kenneth Shipley (ERC Art Department). The two parts of the cover illustration taken together express the spirit of science in its deepest sense.

Works of art need not be interpreted to earn recognition. However, in this case, the message is so necessary that the reader is urged to give sufficient thought to the art forms to establish, for himself, the symbolic expression they are intended to convey.

I - PURPOSE AND FOCUS OF SEMINAR

The purpose of the Seminar in Design and Development of Science Instructional Materials was to improve the quality of teaching by the participants in their classrooms. Specific criteria for "quality" must, of necessity, be arbitrary. In this case, the criteria were attitudes toward, and skills in, science teaching that would be consistent with the nature of science and the nature of the adolescent individual.

It was assumed that most junior high school science teachers do not manifest these desirable attitudes and skills in their teaching. Science educators have generally agreed that direct observation of junior high school science classrooms leads to the conclusion that science is taught in an authoritative show and tell (or didactic) fashion in which the content or knowledge of science is stressed to the exclusion of the process dimension of science. Science has most often been viewed as a body of knowledge to be transmitted, rather than as an attitude toward, and a way of, learning (or knowing).

The characteristic of science that distinguishes it from other categories of human endeavor is more than the specific set of facts or current theories that are associated with it. Rather, the unique nature of science is to be found mainly in terms of how and why some-

thing is known. Facts and theories change in time, old concepts are replaced by new ones, and debates arise over the interpretation of data. These are the essence of science. These are the aspects of sciences that will endure each individual's lifetime. These are the features of science that can have humanistic appeal to all individuals.

The fact oriented approach to science has caused alarm among many educators. This approach has probably caused a movement away from science by today's young people. Enrollments in elective science courses in senior high schools have decreased in spite of this being an Age of Science and in spite of up-dated science courses which have been adopted in most schools.

No one has established a causative link between didactic science teaching and decreasing enrollments. One clue, however, is that large scale teacher attendance at summer institutes has not reversed the trend of decreasing enrollments. These institutes typically have been funded by the National Science Foundation and conducted by colleges and universities and have been designed to upgrade the science teacher's background in science. To achieve this the institute participant has been subjected to conventional college science courses. When one considers the high degree of pedantry in these courses and the tendency for teachers to teach as they are taught, it is not surprising that most junior high school science courses resemble only dull watered-down

college science courses with instructional methods to match.

The instructional materials available for use in junior high schools have generally conformed to the pedant-syndrome described above. Some notable exceptions have arisen in the past decade as products of large scale curriculum projects. Most of these updated materials were conceived in the true spirit of science , that is, open inquiry. However, recent studies have shown that these materials seldom get used in the same spirit in which they were conceived.

Open inquiry, as conceived by the creators of the "new" courses, too frequently has degenerated into just another dogma in the hands of teachers who know and/or practice only didacticism. In other words, the new instructional materials have frequently been distorted to fit the traditional mode which they were intended to replace.

The unhappy state of affairs with regard to "new" science courses has occurred in spite of some early evaluative studies that indicated these courses produced a real movement toward true science. One can only infer that the non-fulfillment of early aspirations for the "new" courses is due to the fact that no instructional materials are "teacher proof."

Still, the fact remains that "new" instructional materials in the hands of teachers who have participated in their development do produce enhanced results in learning and interest by students. It is very

tempting to conclude that the reason for this success is due to the individual teacher's involvement in developing the instructional materials. The teacher knows the intent of, and rationale for, every part of the instructional package. He knows because it is the product of his own efforts.

In addition, there is bound to be a halo effect purely because it is "his." This effect carries over to students who receive many cues, verbal and non-verbal, that this material is good and worthwhile because it makes sense to, and is truly understood by, the teacher. This attitude on the teacher's part could not possibly have been developed by his having taken more formal science courses or attending a dozen workshops conducted by a well-meaning publisher of instructional materials.

The preceding remarks lead up to the idea that a potentially effective way to improve a science teacher's competence would be to involve him in a curriculum development project. In effect, that was the essence of the Seminar in Design and Development of Science Instructional Materials as it was proposed to the John Huntington Fund for Education. Each participant would design, develop, package, field test, and modify a short science instructional unit and become a better classroom teacher as a result.

The most tangible product of the seminar would be the instructional unit, but its importance would be secondary to the improvement of the individual participant's science teaching competence. The problem of

designing and producing the instructional unit would provide a real, achievable, short range goal for each participant. Achievement of this goal would be parallel to achievement of the primary goal and would provide a sense of immediate relevance for activities of the seminar.

The lack of a sense of immediate relevance weakens the impact of many education courses that are designed to prepare teachers. The usual courses, in effect, provide answers to questions and problems that those enrolled have not perceived. The answers (i.e. course content) may be quite valid and yet they are neither assimilated nor accommodated by those enrolled.

The Seminar in the Design and Development of Science Instructional Materials was intended to provide an alternative to the usual course structure intended to improve or develop teacher competence and to provide and capitalize on a sense of immediate relevance rather than be hampered by the absence of this sense.

II - STRUCTURE OF SEMINAR

A four-phase structure to extend through eight weeks was conceived for the seminar:

Phase I	Development of science education theory
Phase II	Design and packaging of science instructional unit
Phase III	Field trial of science instructional unit
Phase IV	Evaluation and revision of instructional unit.

Taken together the four phases on which the Seminar was to be structured resembled that of a small scale curriculum development project. However, instead of all participants collaborating on one instructional unit, each would work on producing his own unit.

Phase I

Phase I was intended to develop a specific theory of science education within each participant and which would serve as the basis for developing real science instructional materials.

A working theory of science education needs to include factors that deal in order with:

1. The nature of science
2. The nature of knowledge

3. The nature of the learner

4. The nature of the learning process

5. Interrelationships among the preceding factors

6. The purposes of science teaching

Most teachers can express opinions on the above topics but these opinions tend to be functionless generalities and/or antiquated. The principal purpose of Phase I of the seminar was to enable each participant to sharpen and modernize his own thinking on these topics to the point that he could use it to build a rationale for an instructional unit which he would develop.

A secondary purpose of Phase I was to expand the participant's repertoire of instructional techniques so that he could have a broader base from which to design the instructional unit in Phase II.

It was anticipated that Phase I could be accomplished by establishing a series of minicourses (1-2 days in duration)and microcourses (one day or less) as the core of Phase I for planning purposes. A minicourse or microcourse was conceived as a coherent set of activities to achieve short range objectives and within which a variety of instructional techniques would be used. Thus, the medium would be consistent with the "message."

Phase II

In Phase II, each participant would determine his own pattern

of operation having learned how other curriculum developers had worked on other projects. This phase was clearly mission oriented to produce a usable instructional package for one week's work in a seventh grade class that met one period per day. Criteria for usability would be derivable from the theory developed in Phase I. Hopefully, these criteria would include: student involvement, performance objectives, relevant topic, open-endedness and probable feasibility.

One could only estimate these criteria intuitively because in actual use, there could be unexpected problems or contingencies. To discover these difficulties and problems was the purpose of Phase III.

Phase III

Phase III would enable each participant to teach his instructional unit in two different settings. One setting would be that of a suburban classroom and the second, that of an innercity classroom. This approach, of course, would impose the assumption that the same instructional materials would be appropriate in both locations.

The trial teaching of the units in Phase III would be accompanied by daily video taping and analysis of the sessions by the participants. The purpose of this procedure would be to provide feedback information both on the effectiveness of the materials and the teacher-student interaction that occurred.

Phase IV

Phase IV would be the least structured week of the whole seminar. Its principal purpose would be to enable the participants to make revisions of their instructional materials on the basis of the feedback obtained from the field trials. A secondary purpose would be to evaluate the whole seminar and make recommendations for improvement. The mission orientation of this week would be to prepare copies of revised instructional materials so that the unit might be taught more effectively in the classroom during the coming year. However, there would be no commitment sought nor made to actually use the unit in a regular class.

It would be conceivable that the instructional units might be useful to other participants in the seminar since they would have had close contact with the development of them. It was assumed that if it became appropriate for copies of the units to be distributed to all participants, they would initiate a request to do so.

This one example of pre-structuring by assuming that participant initiative would be a deciding factor wherever it could be justified (by the participants) was actually implicit throughout the seminar. It was hoped that this approach would serve as an exemplar for the participants and be a case of teaching by the "Do-as-I-do" technique that is too frequently subverted by the "Do-as-I-say-not-as-I-do" technique.

III - SEMINAR PROCEEDINGS

The purpose of this section is to document the actual proceedings of the Seminar. The details presented are intended to include only those things that seem to have significance for similar projects.

Preliminary Planning

Preliminary planning for the Seminar was done in conference with several individuals from Cleveland State University and from the science staff of the Educational Research Council of America. In both group and individual sessions, the basic question for discussion was, "What would you do in eight weeks with ten participants given the basic premises of the seminar?"

The "basic premises" were:

1. All participants would be experienced science teachers.
2. The main purpose would be to improve science teaching in the participants' classrooms.
3. The basic format would be the miniature curriculum development project described

earlier.

4. The seminar would carry graduate credit in the College of Education of Cleveland State University.

The preliminary planning conferences led to apportioning the eight weeks of the Seminar into segments:

Phase I - (theory development) - 3 weeks

Phase II - (unit fabrication) - 2 weeks

Phase III - (field trial) - 2 weeks

Phase IV - (evaluation) -- 1 week

Within these time allotments, activities were planned to achieve the principal objective of that segment. A concerted effort was made to contrive varied activities because a major "theme" of the Seminar was that a mix of instructional modes is far superior to any one mode. To deliver this "message" it was felt that seminar action should be consistent with the theory it espouses. It should be noted that a common failing of many education courses is found when the lecture method is used to teach about other methods of teaching and, in fact, to convince students that lecturing is an ineffective mode of instruction.

Supporting articles, etc. from various literature sources were searched out and copied for use during the seminar. Not all articles were used,however,others were identified once the seminar was under-

way. A complete listing of literature distributed to all participants is in the Appendix.

Preliminary planning also led to the decision to restrict participation to junior high school and middle school science teachers. The principal arguments for this decision were:

1. All participants should have some common background.
2. Junior high school and middle school teachers have, as a group, been largely overlooked by special summer institute programs.

Recruiting of Participants

The recruiting of participants was complicated by the fact that a source of money for stipends was not forthcoming. Therefore, the only external inducement that was available was free tuition for ten hours of graduate credit. Each participant had to give up possible summer income and pay his own expenses for meals and transportation. The latter item was substantial since the Seminar was conducted in the Rockefeller Building located in downtown Cleveland.

The principal recruiting device was a form letter distributed to junior high school science teachers by way of building principals (see

Appendix for copy of letter). Subsequent random telephone calls to a few individuals who might be interested in the program showed that this approach was less than 100% effective in making actual contact with the target group of teachers. The "target group" was defined as all junior high school and middle school science teachers in Cuyahoga County (ie. Metropolitan Cleveland).

Selection of Participants

In planning the composition of the Seminar, it was decided that personal motivation, at least one year of full-time teaching experience, and a commitment to teaching science in the near future would be the only criteria for selection. Academic background in science would not be a factor as it was felt that the Seminar could be individualized to accommodate participants of widely varying backgrounds.

Fourteen applicants were screened and ten were selected, mainly on the basis of what they wrote as personal motivation for wanting to participate.

The Seminar convened on June 16, 1969 and began work immediately.

The first topic of concern was that of resolving questions that arose from the participants.

Grades

Among these questions was the problem of determining the basis for grades. This was necessitated by the fact that all but one participant had enrolled for graduate credit at Cleveland State University*.

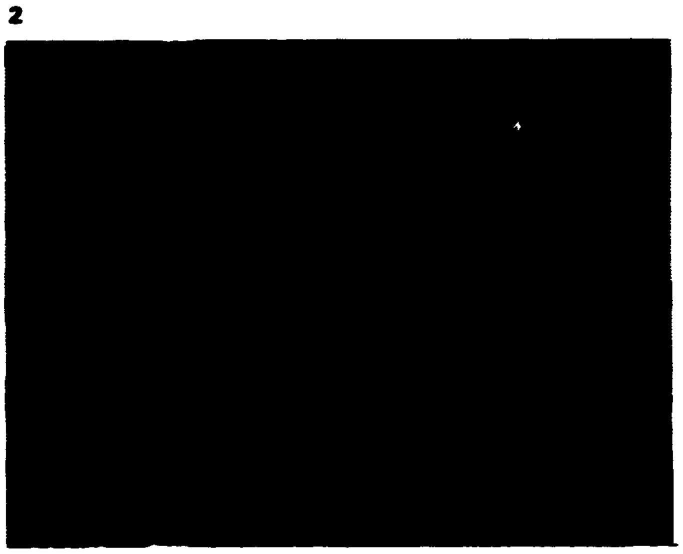
The problem was resolved as the result of a group discussion and the procedure and final decision had obvious implications for regular classroom practice at all levels. The decision was to give each participant an "A" provided that he would successfully produce and teach an instructional unit.

Later there was some discussion about what constituted "successfully" but no clear cut consensus was forthcoming. Nevertheless, the all-A agreement seemed to be very appropriate in actual practice. Each individual seemed to put forth a strong effort. Even more importantly, it freed participants and staff from the restricting notion that everyone should do exactly the same thing. Further, it minimized the competitive aspect and the esprit de corps of the group appeared to be strengthened, at least in part, because of the decision. The decision also strengthened the notion that the participants had a real role in making decisions.

* The official seminar designation by Cleveland State University was "Education 591 - Design and Development of Science Materials" The course carried 10 hours of graduate credit and was restricted to participants of the Seminar.

1

2



3

1. Victor Showalter, Seminar Director, prepares one of many tentative weekly agendas.

2. Joe Kotva ponders a point during a mini-course discussion in the ERC Science Material Center.

3. Sister Daniel Mary demonstrates a provocative phenomenon to the seminar as part of the session devoted to "Creativity in Teaching Science."

Objectives and Scheduling of Phase I

Several questions on objectives showed that most participants expected to be told exactly what they should do. However, the question of grades and its solution convinced the participants that they would be largely responsible for achieving the mission of the Seminar with a minimum of pre-structuring imposed on them.

Schedules of minicourses and microcourses were made for each week and then subjected to modification as the need occurred - which was often. Typical weekly schedules can be found in the Appendix.

Various staff members of the Educational Research Council were utilized in planning and conducting the minicourses and microcourses each of which was varied within itself. For instance, the minicourse, "Nature of Science," contained an illustrated lecture, demonstrations, discussion, reading, a short term open-ended investigation by each participant, and individual reports of the investigations.

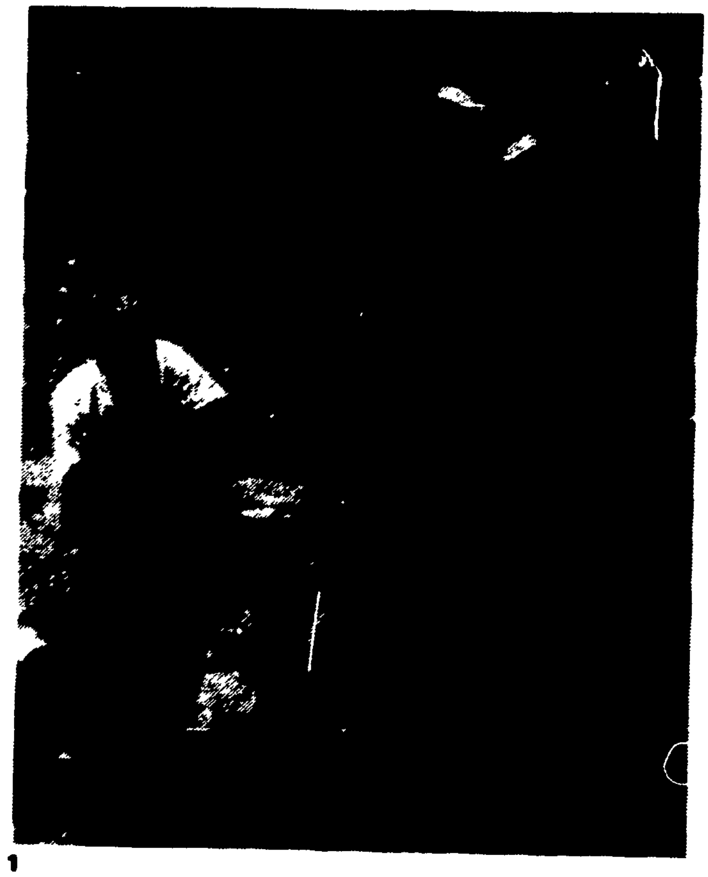
The microcourse, "Instructional Games," included a two-man dialog presentation followed by the whole group's playing several illustrative instructional games and a subsequent group discussion.

The minicourse, "Use of Community Resources," involved a model field trip to a lakefront beach, an urban park, and the Federal Water Pollution Control Authority regional laboratories. The subject theme of the field trip was "Relevance of Science for Urban Students."

1. The potential usefulness of an innercity playground as a science resource is explored by the seminar (L. to R. R. Dove, Sr. Donna.

2. Fred Rasmussen and Paul Holobinko of the ERC staff prepare to express their point-of-view.

3. A typical seminar session in Phase I. Mike Morris demonstrates how a magnetic pendulum could be used in the classroom. Participants Mae Eldridge, Bill Thompson and Helen Sexton are looking on while Fred Rasmussen (ERC staff) is an interested observer.



1

2

3

An interesting microcourse, "Creativity in Teaching," involved sending the participants to downtown stores to find and buy an inexpensive device that could be used in an inquiry oriented science classroom. This task was intended to broaden the participant's notion of what can be used as science instructional materials.

Phase II Activities

Each participant developed a one-week unit on some topic that he thought would be interesting to seventh graders. Development consisted of identifying objectives of learning and organizing resources to facilitate involvement of each student in active learning.

Participants tried out potential laboratory activities and prepared appropriate printed materials for the students. A strong effort was made to use only inexpensive, easy-to-obtain materials and to require no sophisticated apparatus. The science materials center and laboratories of the Educational Research Council were found to be adequate for this purpose although some use was made of outside community resources (e.g. university laboratory supplies and industrial laboratories).

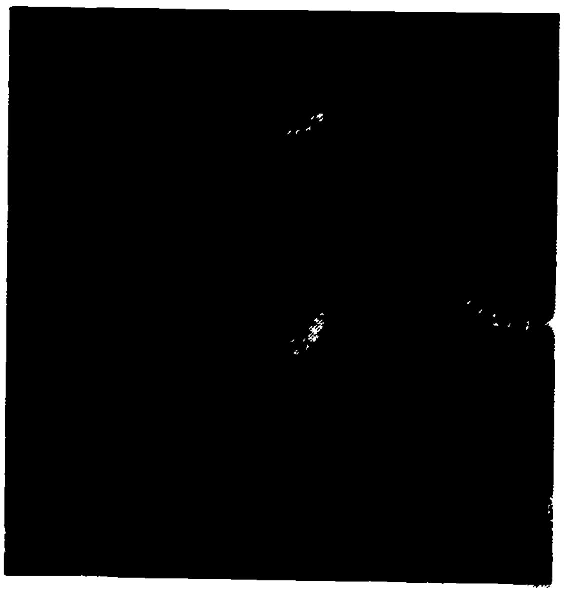
The following instructional units were developed by the participants:

"Microbes in Our Environment"

"Scientific Street Destruction" (breaking,
cracking, and resistances to destructive

1

2



3

1. Seminar participants observe an attempt at ecological modification as the City of Clevel. .d seals off and chlorinates a small portion of Lake Erie for public bathing. The visit was part of the "mini-course" on using local resources in science teaching.

2. Sister Donna Zeller listens to a student's idea on how to prolong the "life" of an ice cube during field trial of her unit, "Insulators."

3. Bill Thompson and a student watch an experiment designed to give information about "Water in the Air" during field trial of the unit.

Black children.

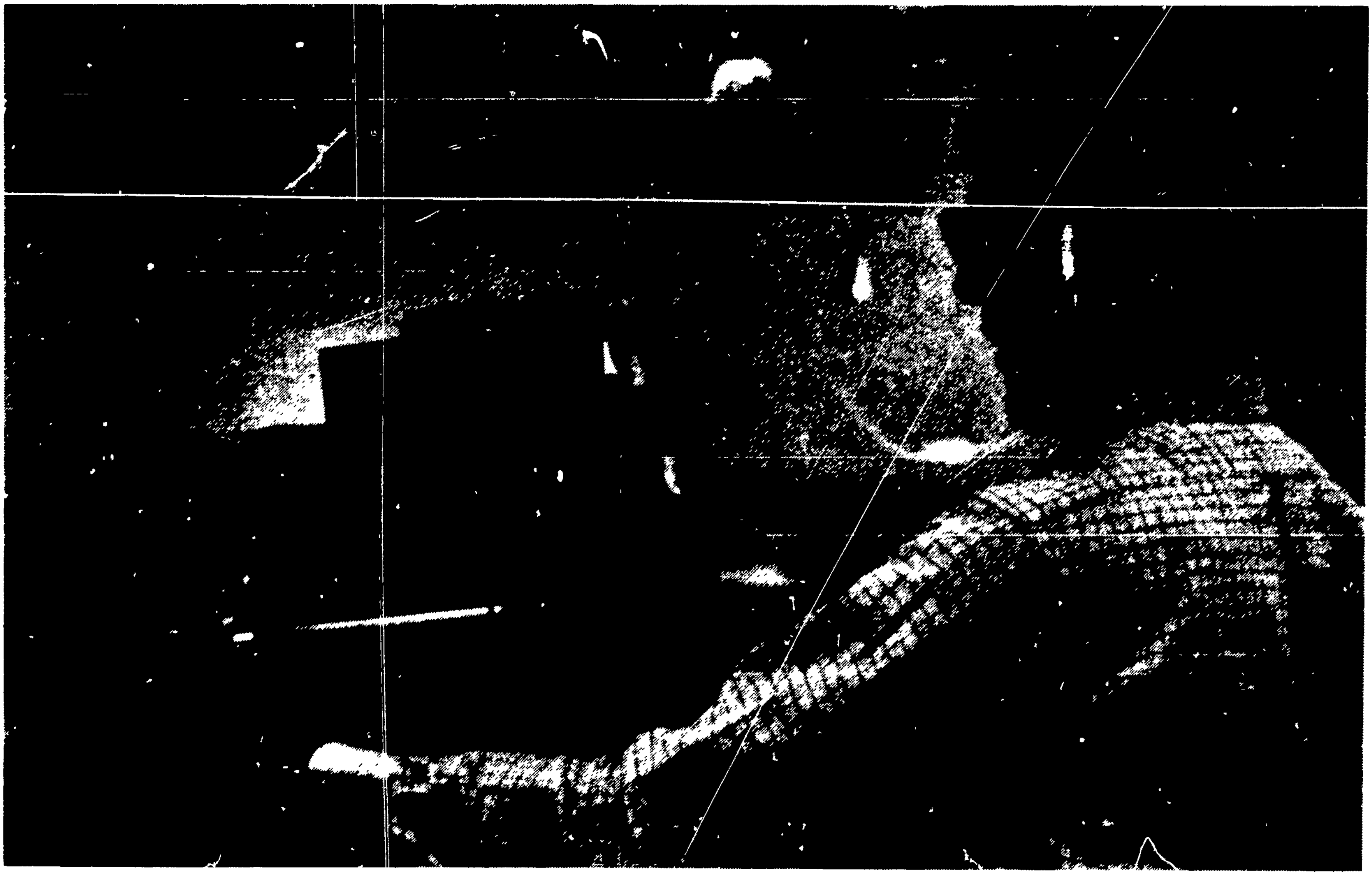
During the first week of Phase III, each teacher taught his unit at either Westlake Parkside or Lakewood Hayes. In each case the students were drawn from a summer school science enrichment class. At Parkside, the field test pre-empted the last week of the enrichment class. The students had graduated from Grade 5 or 6 the past Spring.

There were 21 students in the Parkside group. These were divided into three groups that met at 8:00 AM and two groups that met at 9:00 AM. Another group met at 10:00 AM and was composed of volunteers since the science enrichment class normally ended at 10:00 AM.

All groups met either in the fine arts or home arts room of Parkside School. While neither of these facilities was designed for science, each had modern table space, sinks, lighting, and adequate space in which to move about.

The student group at Lakewood Hayes was composed of ten volunteers who attended the science enrichment class in the morning and participated in the field trial in the afternoon. The total group was divided into three sub-groups which met at 1:00 PM for one hour in sixth grade science rooms.

At both schools, the planned week of field testing was shortened by the presidential proclamation of National Participation Day following the historic moon landing. At Hayes, a second day was lost because of an all day field trip by the science enrichment class. (This had not



1

1. Roy Bernebei mans the video unit in recording the field trial of an instructional unit.

2. Mike Morris listens to a student's contribution during field trial of his unit, "Scientific Street Destruction."

3. Bob Dove raises a question in response to a student's suggestion for an experiment with ants during field trial of his unit, "Taster's Choice."

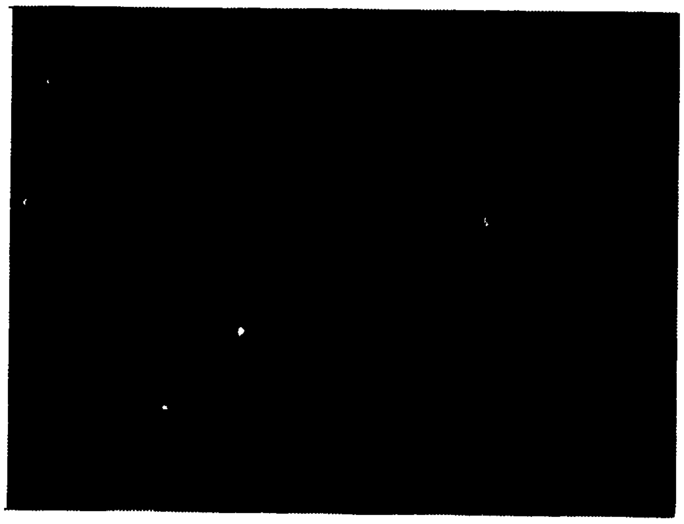
2

3

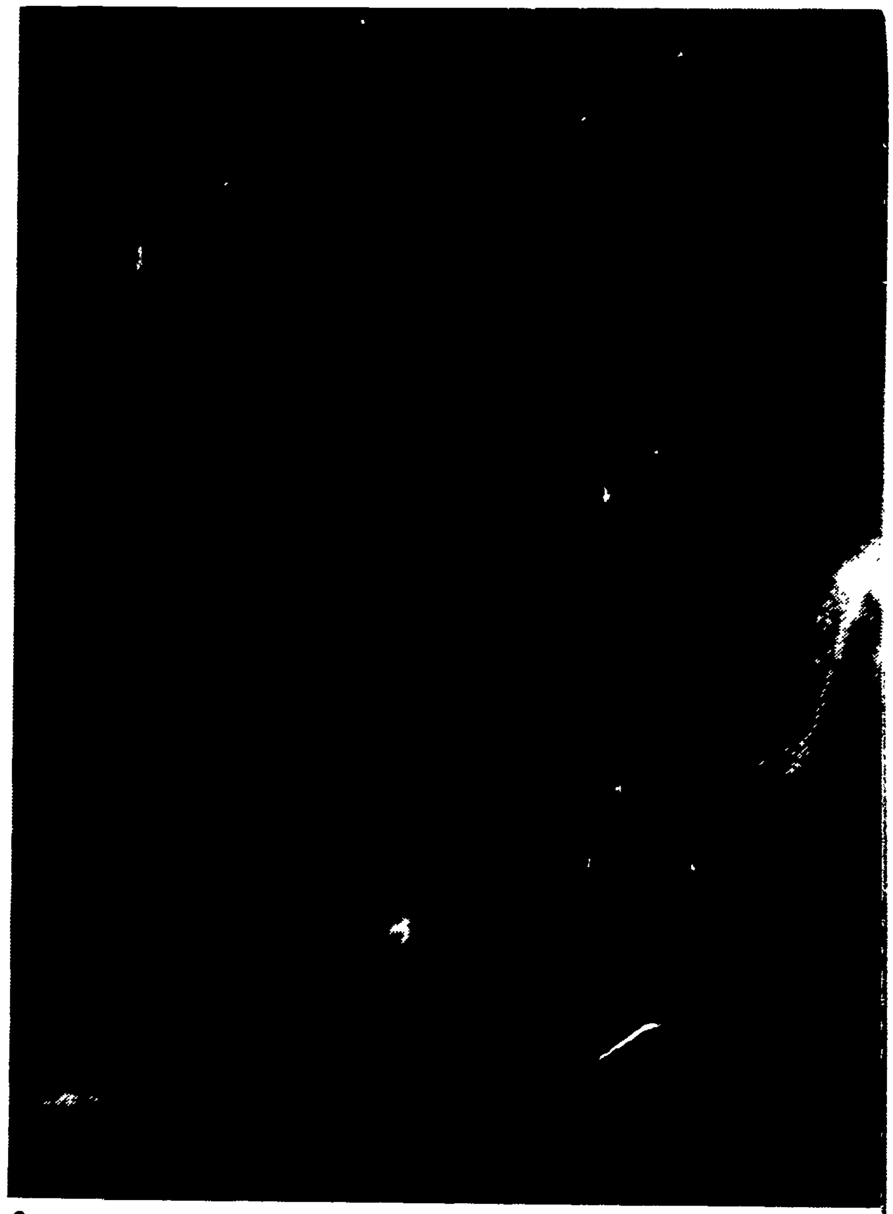
1. Art Olson plays (and loses) the game with students during field trial of his unit, "What Price Cleanliness?"

2. Paul Jerdonek takes a turn at video taping a part of the field trial of instructional units.

3. Helen Sexton watches students working at the Lexington Square Community Center field trial of her unit, "Which One Will Do the Job?"



1



2

3

been anticipated by the coordinating school administrator).

Video taping of class sessions was conducted for the purpose of critical analysis by the Seminar participants. The latter activity was conducted within 24 hours of the actual class session.

The innercity portion of the field trial was conducted the following week without unanticipated time losses. Two non-school sites and non-school groups of students were used.

One group of 12 students convened at the Antioch Baptist Church having been recruited by the Council of Economic Opportunities in Cleveland. These students (ages 13-16) were paid by the Council for their participation.

The other group of 12 students convened at the Lexington Square Community Center having been recruited by the Better Homes for Cleveland Foundation. These students (ages 11-14) participated on a purely voluntary basis.

In both locations the student groups were split into two subgroups and classes conducted in the mornings for 50 minute periods. Both locations provided table space and sinks. All other equipment and supplies were brought in by the teachers.

Video taping and group analysis of the recorded class episodes followed the general pattern established during the first week.

Phase IV Activities

This phase lasted one week and was devoted to three activities:

1. Revision of instructional units and preparation in a form that might be used by other teachers.
2. Cleaning up the Seminar facilities used at ERC.
3. Evaluation of the Seminar, its activities, and objectives. (A summary of the evaluation comprises the next section of this report).

1. Mae Eldridge concentrates on expressing her opinions during the final evaluation session.

2. Everyone participates in writing an evaluation of the whole seminar.

1

2

IV - EVALUATION OF SEMINAR

Participants' Evaluations

On the last day of the Seminar, participants were asked to evaluate specific activities of the Seminar on two criteria: interest and relevance. Interest was defined as referring only to the individual in terms of his own background. Relevance was defined as being directly related to teaching of science as he personally had been involved in it.

Specific activities were itemized and listed. Each participant was asked to rate each item for each criterion on a scale of 1 (low) to 5 (high). A summary of the responses is shown in Table 1. The numbers in parentheses show how many responses were made for each rating of a particular item. The "total" column gives the weighted sum of the responses for an item with 5 points for a "5", 4 points for a "4", etc. Eight individuals responded to each item. Thus the maximum total for an item for either criterion is 40.

Interpretation of the data in Table 1 is difficult. It is very tempting to generalize and say that here is an accurate reflection of an overall feeling of "worthwhileness" by the participants.

There seems to be no anomalies in the relative responses to "in-

TABLE 1

PARTICIPANTS EVALUATION OF SEMINAR ACTIVITIES

Interest						Activity	Relevance					
Total	Lo				Hi		Lo				Hi	Total
	1	2	3	4	5		1	2	3	4	5	
37				(3)	(5)	Minicourse-Nature of Science				(2)	(6)	38
35			(1)	(3)	(4)	Minicourse-Nature of Learner			(1)	(1)	(6)	37
37			(1)	(1)	(6)	Minicourse-Purpose of Science Teaching			(1)		(6)	38
37				(3)	(5)	Minicourse-Individual Investigation in Science			(2)	(2)	(4)	34
39				(1)	(7)	Minicourse-Use of Community Resources (field trips, etc.)		(1)		(2)	(5)	35
32			(2)	(4)	(2)	Microcourse-Creativity in Teaching		(1)	(2)	(4)	(1)	29
36				(4)	(4)	Microcourse-Simulated Experiment		(2)	(2)	(2)	(2)	28
33		(1)	(1)	(2)	(4)	Microcourse-Instructional Games			(4)	(1)	(3)	31
32		(1)	(2)	(1)	(4)	Microcourse-What should an ideal instructional package contain?				(4)	(4)	36
35			(1)	(3)	(4)	Video tapes of trial classes and discussion				(3)	(5)	37
37				(3)	(5)	Survey of various science instructional materials (ESS, ESCP, AAAS, etc.)			(1)	(3)	(4)	33

TABLE 1 (cont.)

	Interest					Activity	Relevance					
Total	Lo 1	2	3	Hi 4	5		Lo 1	2	3	Hi 4	5	Total
37				(3)	(5)	Student evaluations of trial units					(8)	40
34			(1)	(4)	(3)	Handouts (books, reprints, etc.)				(3)	(5)	37
26	(1)	(1)	(3)	(1)	(2)	Tests (TOUS,etc.)		(2)	(2)	(3)	(1)	27
37			(1)	(1)	(6)	Informal discussions with ERC staff			(2)	(1)	(5)	35
39				(1)	(7)	Informal discussions with other participants				(2)	(6)	38
28		(2)		(1)	(4)	Open reading blocks			(3)	(2)	(3)	32
				(2)	(5)	Other (specify) - Developing (writing) unit				(1)	(6)	
39				(1)	(7)	Other (specify) - Field test of unit				(2)	(6)	38
					(1)	Other (specify) - Exchange of revised units					(1)	

terest" and "relevance" criteria for any one item. In the first place, there seems to be a strong correlation between the two. In the second place, those items that show a difference, do so in the direction that would be predicted. For instance, the microcourse on simulated experiments shows a higher rating on the interest scale than on the relevance scale. Since materials for simulated experiments are not available for general classroom use, the direction of this difference would be predicted.

It should be recalled that there were none of the usual external inducements for participants to "give" high ratings. All participants knew that each had already received an "A" in the course. Also there was no probability that the staff of ERC would be involved in further graduate work by the individual. These facts tend to validate the generally high ratings.

Following the evaluation of seminar activities using the rating scales, the participants were asked to write suggestions for improving the Seminar if a second one were to be offered in the future. This task was obviously open-ended,however, all responses are summarized in Table 2.

To prepare Table 2, the original responses were categorized and paraphrased to give the results reported. The number in parenthesis at the end of each item is the number of individuals who wrote that

particular response. As with the previous evaluation, there were eight participants involved. The summary speaks for itself and requires no explanation.

A third part of the evaluation consisted of having the participants respond freely to the question, "What were your general reactions to the Seminar?" The general tone of these reactions was favorable. It was not appropriate to categorize these reactions because they varied considerably in theme and form. However, all responses were transcribed and can be found in the Appendix.

TABLE 2

IMPROVEMENTS IN FUTURE SEMINARS
SUGGESTED BY PARTICIPANTS

Phase I - Theory of Science Education

1. Discussion of what are appropriate topics for target students. (1)
2. More time to examine other programs. (1)
3. P.M. activities should involve participants in doing what A.M. presentation was about. (1)
4. Some days' lecture portions should be shorter. (2)
5. Assign out of class reading. (2)
6. Some staff presentation should be better organized and prepared. (1)

Phase II - Fabrication of Instructional Unit

1. More time needed between 1st and 2nd field trials. (5)
2. Should be done in P.M. in conjunction with Phase I in A.M. (1)
3. Arrange for more interaction among participants as an aid in preparing unit. (1)

Phase III - Field Trial of Instructional Units

1. More time needed between 1st and 2nd field trials. (5)
2. Larger classes for field trials. (2)
3. Shorten evaluation week. (1)
4. Conduct unit trial in only one location. (1)
5. Use Cleveland city schools instead of non-school setting. (1)
6. Students should be arranged for earlier in year. (1)
7. All field testing should be conducted in classes where kids are regularly enrolled. (1)
8. Same setting (enrichment) should have been used in both trials. (1)

General

1. Stipends should be available. (2)
2. Shorten time (both day and weeks). (3)
3. Should be paid for meals and parking. (1)
4. Credit hours (semesters or quarters) should be made clear to

participants. (1)

5. More explicit information sent to prospective participants prior to seminar. (1)
6. Earlier notification of selection. (1)
7. Establish a meeting for participants in future to check on changes in teaching. (1)

Pre- and Post-Tests

Four test instruments were administered to the seminar participants before and after the eight weeks of the Seminar. There were two purposes in doing this. First, it was desirable to know something about the participant's level of scientific and pedagogical literacy at the beginning of the Seminar so that subsequent activities could be planned accordingly. Second, a comparison of pre- and post-test scores could give some objectivity to assessing the impact of the Seminar on the participants.

Tests of Scientific Literacy

Three different tests that purport to measure some aspect(s) of scientific literacy were given. Each showed essentially the same results. In general the post-test scores were higher, but there was not enough difference to constitute statistical significance. The tests used and their authors were: Tests on Understanding Science (TOUS), W. W. Cooley and L. E. Klopfer (published by Educational Testing Service); Test on the Social Aspects of Science, W. W. Korth; Abridged Scientific Literacy Instrument, V. M. Showalter.

The slight, but statistically insignificant, improvement in these test scores is not inconsistent with what might have been predicted. The pre-tests showed that there were no glaring weaknesses in this area.

All participants scored in the same rather narrow range which appeared to be "normal." However, it must be noted that there are no well established norms for science teachers on these tests.

Test of Pedagogical Literacy

A Test on Learning and Instructional Processes was constructed specifically for use with seminar participants by J. J. Gallagher of the ERC staff. The test was rather open-ended as each participant was asked to agree or disagree with each of six statements and to write the reasons on which his decision was based.

Scoring of the test was done by categorizing the reasons for each item into one of three levels of increasing sophistication. Specific criteria were established to be used in categorization.

Although this test has not been extensively developed in statistical terms, the results summarized in Table 3 give a clear impression of improvement from pre-test to post-test. It could be argued that this dimension (i.e. pedagogical literacy) represented a weaker background among the participants as they entered the Seminar and, therefore, should be amenable to change and the detection of change.

Table 3

SUMMARY OF TEST ON LEARNING AND INSTRUCTIONAL PROCESSES

		Mean Response Level (1-3)		Change in Response Level from pre-test to post-test (number)		
		Before	After	+	0	-*
1.	In planning instruction related to a science concept or principle for junior high school students, it is important to know the students' present state of knowledge about the concept or principle.	1.9	1.9	1	6	1
2.	Instruction in junior high school science should consist primarily of "lab" activities rather than lecture-demonstrations.	1.9	2.5	4	4	0
3.	An important object of a junior high school program in science is to build an understanding of the atomic structure of matter.	1.5	2.0	4	4	0

* + = increase
0 = no change
- = decrease

TABLE 3 (con't)

		Before	After	+	0	-
4.	Another important objective of a junior high school program in science is "To help students develop an understanding of the scientific method."	1.2	1.9	4	3	1
5.	Junior high school students learn science best when the objectives and instructional procedures are logically organized.	2.1	2.2	2	3	3
6.	One new program in junior high school science is designed to allow children to explore freely (as they call it "mess about") as an important step in the learning process. Do you agree or disagree with this approach? Give reasons for your decision.	1.6	2.1	3	5	0

General Conclusions

These are supported only in a general way by test data and certainly have been influenced considerably by personal bias and intuition. However, these statements appear to be defensible:

1. The participants learned that junior high school students

learn in a greater assortment of ways and through a larger variety of activities than realized before attending the Seminar.

2. The participants learned that effective teaching can be enhanced by deliberately applying theoretical knowledge about how young people learn.

3. The participants learned that a broadened range of subject matter is legitimate content for science instruction in the schools.

4. The participants learned that a variety of learnings can be expected to occur when different young people are placed in a contrived school situation and that many types of learning are equally valuable.

5. The participants learned that effective science teaching is based on selecting objectives and content that are real for the learners.

6. The participants learned that innovative teaching practices can be tried with small groups of students with a minimum threat to the teacher's personal security. The participants, unfortunately, seemed to retain the notion that these practices probably could not be applied to full size classes.

7. The participants learned that grades are not necessary to motivate students - at least for relatively short range units

of work.

The general behavioral outcome of these conclusions, hopefully, will be shown in increased classroom effectiveness by the participants in guiding students' learning in science. At any rate, the general feeling persists that the immediate objectives of the Seminar have been realized. The concept of the Seminar in the Design and Development of Science Instructional Materials is valid as a vehicle for professional education of teachers on a graduate level.

V - RECOMMENDATIONS

On the bases of the evaluation of the Seminar as reported in Part IV and of two weeks of subjective reflection and discussion on the Seminar as it was conducted, several recommendations are warranted. Although the full rationale for each recommendation is lengthy and probably relevant, it has been omitted for the sake of brevity.

1. Future Seminars of Similar Nature

There should be other seminars in the future with a similar focus and structure. These should develop further the basic concept of a miniature curriculum development project that was initiated in this seminar.

Probable modifications of subsequent projects could well be based on those recommendations that follow this one. Some of the reasons for conducting similar seminars are implicit in recommendations 2-10, while other reasons are more explicit in the specific evaluations in Part IV of this report.

2. Teaching Exemplars

There is a need for experienced teachers to observe, carefully and critically, alternative teaching styles and practices. The traditional

way to do this has been to visit and observe other teachers but even this is not done often enough and when it is, there is no opportunity for intellectualization and accommodation of what was observed. In short, there has been no impact.

A library of video tapes in which various teaching styles and instructional modes are used with real groups of learners should be developed. Ideally, each edited episode should last no longer than 15 minutes but should communicate context, instructional objectives and probably specific instructional strategies that were planned. The episodes should focus equally on student behavior and on teacher behavior.

3. Assessment of Seminar Impact

In addition to the evaluative activities reported in Part IV of this report, the impact of future seminars should be assessed in terms of actual changes in the participants teaching behavior. This means that some observation of each participant's teaching must be made before and after the seminar.

Considering the need to obtain a representative (i.e. several separate observations) sample of teaching behaviors, and the probable number of participants, the task is formidable. However, it might be possible to reduce the task to a practical level by using two techniques:

a. Have each teacher tape record (audio only) each session of a given class for one week both before and after the seminar.

Then, student and teacher interaction could be sampled on a statistical basis.

b. Collect teacher constructed tests on the same pre- and post basis and analyze each for the kinds of questions that are asked.

While neither proposed technique will provide detailed data such as a classroom observation schedule would, the economy in time and expense make them attractive.

4. Seminar Staffing

It is obvious that this aspect of any future seminar is crucial. Detailed criteria for staff are difficult to specify. However, there is one criterion of prime importance - each staff member must be prepared to teach the seminar using exactly the same methodology that he advocates be used in participants' classrooms. There are many reasons to believe that the staff person's actions do truly speak louder than his words.

As has been mentioned previously, there has been a clear dichotomy in most education courses between theory and action. Professors traditionally lecture about the evils of lecturing. This potential split must be dissolved in a seminar of this kind.

Further criteria for staff selection include: recent teaching ex-

perience at the same level as the participants and actual experience in preparing instructional materials through the full cycle of design, development, field trial, revision.

5. Composition of Seminar

The size of this type seminar should not be any less than ten and could reach a maximum of twenty. It is desirable to have all participants from a relatively small geographical area so that they can appreciate each other's unique school situation.

The middle school - junior high school mix of teaching assignments is appropriate. It would be undesirable to include senior high school teachers with this group. A separate seminar composed exclusively of senior high school teachers and/or junior college instructors would seem to be very appropriate and have unique merits of its own.

6. General Structure of Seminar

The four phases used in this project would be convenient and appropriate for a similar seminar. Phase I should be extended to four weeks and Phase II to three weeks if the last two weeks of Phase I overlapped the first two weeks of Phase II. This would not extend the overall duration of the seminar if Phase I activities were limited to the morning of the "overlapped" two weeks and Phase II activities were confined to afternoons.

The microcourse and minicourse concepts should be retained as they provide an eminently suitable structure both for planners and participants.

7. Follow-up Activities

Provision should be made to reinforce those learnings that occur during the seminar by arranging two follow-up meetings for the whole group. Ideally, the first would be conducted in mid-October and the second in early December. The agenda for each meeting would be based on the topic "What I have done with the classes I teach."

8. Graduate Credit

Graduate credit must be available for participation in the seminar. This means that the seminar director will need to work out details with some university. There may be some initial resistance within the university to granting credit for a non-traditional course but it can be overcome and, in the long run, will be of value to the university in widening its concept of relevant education for teachers of science.

9. Stipends and Expenses

Moderate stipends should be made available to compensate teachers for at least part of the potential income they could obtain in a summer job. At a minimum, this stipend should cover cost of transportation to the seminar. At a maximum, the stipend should follow the National

Science Foundation Summer Institute formula of $75.00/week plus $15.00/week for each dependent up to a maximum of four dependents.

There should be at least $150.00/participant available in the general budget to cover the cost of printed materials and supplies.

10. Field Trial Groups

Groups of students for the field trial phase should be about twice as large as the groups of six used in this project. Also, the setting should probably be confined to regular school rooms. The purpose of these changes is to enhance the "reality" of the situations so that participants may more readily envision the same innovative activities in their own classes.

Student groups of more than twelve should be avoided because larger groups inhibit the participants willingness to depart from his accustomed style and modes of teaching.

11. Dissemination of this Report

The Seminar in Design and Development of Science Instructional Materials has unique implications for all agencies involved in teacher education programs whether it be at the graduate or undergraduate level. The Seminar provides a prototype of a new approach to teacher education and may well serve as the progenitor of many similar efforts. To this end, this report should be disseminated to those institutions

and agencies which are most receptive and able to extend the seminar idea.

Three copies of this report should be sent to the Educational Resources Information Center (ERIC), Science Education Clearinghouse, Ohio State University. This will assure the document's availability for the foreseeable future without requiring large quantities to be printed and stored locally.

Single copies should be sent to all seminar participants, staff and individuals who assisted in planning the Seminar. Single copies should be sent to the appropriate subdivisions of the National Science Foundation. Single copies should be sent to each department of the Educational Research Council. All copies that remain should be sent to science education departments in leading teacher preparation institutions.

APPENDIX A

PARTICIPANTS IN

SEMINAR IN DESIGN AND DEVELOPMENT OF SCIENCE INSTRUCTIONAL MATERIALS

Participant	1969 School Affiliation
Mr. Robert Dove	Harry E. Davis Junior High School Cleveland, Ohio
Mrs. Artha Eldridge	Robert H. Jamison Junior High School Cleveland, Ohio
Mr. Joseph Kotva	Robert H. Jamison Junior High School Cleveland, Ohio
Mr. David Massaro	Chardon Middle School Chardon, Ohio
Mr. Michael Morris	Roosevelt Junior High School Cleveland Heights, Ohio
Mr. Arthur Olson	Monticello Junior High School Cleveland Heights, Ohio
Mrs. Helen Sexton	St. Clements School Lakewood, Ohio
Sister Daniel Mary	Urban Community School Cleveland, Ohio
Sister Donna Zaller	St. Philomena School East Cleveland, Ohio
Mr. William Thompson	Clara Westropp Junior High School Cleveland, Ohio

APPENDIX B

PUBLISHED AND REPRINTED MATERIALS USED IN THE SEMINAR IN DESIGN AND DEVELOPMENT OF SCIENCE INSTRUCTIONAL MATERIALS (Partial Listing)

The Game of Science; McCain, Garvin and Segal, Erwin; Wadsworth Publishing Co.; Belmont, California. 1969

"New Directions for Science Curriculum Development"; Showalter, Victor; ERC Papers in Science Education; Educational Research Council of America; Cleveland. 1968

"Toward A Theory of Science Education Consistent with Modern Science"; Hurd, Paul; National Science Teachers Association; Washington. 1964

"An Analysis of Research Related to Instructional Procedures in Elementary School Science"; Ramsey, Greg and Howe, Robert; Science and Children; April, 1969

"An Analysis of Research on Instructional Procedures in Secondary School Science"; Ramsey, Gregor and Howe, Robert; The Science Teacher; April, 1969

"Factors That Affect the Desire to Learn"; Kuslan, Louis and Stone, A.; Teaching Children Science: An Inquiry Approach; Wadsworth Publishing Co.; Belmont, California. 1968

"A Condensed Guide to Classification of Educational Objectives"; Showalter, Victor; Educational Research Council of America; Cleveland. 1969

"The Secrets We Keep from Students"; Deterline, William Educational Technology; February, 15, 1968

"The Theory of Expressing Objectives"; Burns, Richard; Educational Technology; October 30, 1967

APPENDIX B (cont.)

"Behavioral Objectives for Unified Science Education"; Showalter, Victor; Professional Growth for Teachers; Croft Educational Services; Fall, 1968

Behavior of Mealworms (Teachers Guide); Elementary Science Study; Webster Division - McGraw Hill, 1966

Gases and Airs (Teachers Guide); Elementary Science Study; Webster Division - McGraw Hill, 1967

2

APPENDIX C

Typical Weekly Schedules for Phase I of Seminar

SEMINAR
Tentative Schedule June 23-27

Monday June 23 MICROCOURSE
The Nature of Learners

Tuesday June 24 MINICOURSE
Learning Activities
Simulated Experiments

Wednesday June 25 MINICOURSE
Learning Activities (Part 2)
LS Format
Games
ESCP Format
Innovation ($2 search)
and Creativity

Thursday June 26 MINICOURSE
Learning Activities (Part 3)
Science Problems Format
Programmed Learning Format
ESS Format
ISCP Format
Van Deventer Format
IME Format

Friday June 27 MINICOURSE
Learning Activities (Part 4)
AV Media
Outdoor resources

APPENDIX C (cont.)

SEMINAR
Tentative Schedule June 30 - July 3

Monday	June 30	MICROCOURSE Instructional Objectives Behavioral or nonbehavioral Writing Levels (cognitive and affective)
Tuesday	July 1	MICROCOURSE What should be the contents of an instructional package?
Wednesday	July 2	MICROCOURSE Evaluation of Achievement of Objectives Preliminary Search for Unit Topic
Thursday	July 3	Identification of Theme for Instructional Unit

APPENDIX D

Proposal for a Seminar in Design and Development
of Science Instructional Materials
(Submitted to the John Huntington
Fund for Education, August 1968)

The Problem

One of the clear conclusions that has been derived from the past decade of secondary school science curriculum development is that improved instructional materials to not necessarily bring about improved instruction. Many teachers have used the new materials in the same ways that they used the outmoded materials. In doing this these teachers have missed the most significant portion of the message in the new materials. They may have missed the true nature of science and, consequently, so have their students.

On the other hand, those teachers who have been directly involved in developing instructional materials have used the materials in their classrooms with more wisdom, enthusiasm, and in the spirit of science. Students in these teachers' classrooms have benefited accordingly.

It seems apparent that in addition to new materials, improved science instruction requires new insights, attitudes, and behaviors by the teacher. To the best of our knowledge no effective effort to amalgamate these several requisites of improved science education is being made by conventional educational institutions.

Proposal

It is proposed that the Science Department of the Educational Research Council (ERC) of America, with the support of the John Huntington Fund for Education, develop and conduct a Seminar in Design and Development of Science Instructional Materials. This seminar, to be conducted for eight weeks during the summer of 1969, will be a pioneering effort to fulfill the needs of classroom science teachers that are implicit in the preceding section. Hopefully, the seminar will serve as a prototype for American teacher education programs and, thus, its impact will be extended beyond its immediate range. Certainly the ultimate benefits of the seminar will be received by society through

APPENDIX D (cont.)

the students that will be affected by the participants in the seminar.

The declared interests of the John Huntington Fund for Education are in concert with the spirit and intent of this proposed seminar.

The proposed seminar would involve ten science teachers from the immediate Cleveland area as participants. The seminar would be arranged and conducted by the ERC Science Staff. The physical facilities of the Council and local schools would be used.

The Science Staff of ERC is eminently qualified for its role in planning and conducting the proposed seminar. Each member of the science staff has had extensive teaching experience at various levels from kindergarten through graduate school. Each science staff member has also had direct experience in developing science instructional materials. Along with other professional qualifications, the ERC Science Staff is uniquely free from the traditional restraints of academic institutions and therefore can conceive bold innovations in teacher training.

The specific purposes of the Seminar in Design and Development of Science Instructional Materials are:

1. To enable science teachers to develop attitudes toward and skills in science instruction that are consistent with the nature of science and the nature of the adolescent.

2. To cause science teachers to apply these reformed attitudes and skills in their classroom teaching.

3. To enable science teachers to participate effectively in science curriculum development projects in the spirit that is consistent with the intentions of the developers.

The estimated cost of planning and conducting the seminar is $1,062 per participant. The proposed budget is analyzed on page 4.

The estimated budget includes money for tuition so that graduate credit may be obtained by each participant. ERC has made preliminary contact with several institutions of higher learning in the Cleveland

area. On the basis of specific contact with Cleveland State University through Dean Samuel Wiggins, provision for graduate credit is assured.

The budget, in its present form, makes nc provision for stipends to the participants. Considering that most teachers depend on summer income as a necessary supplement to their teaching salaries, there may be some problem encountered in enrolling participants in spite of the fact that interest will be high. Therefore, the Science Department of ERC will attempt to find another source of money to provide participants with appropriate stipends.

Research studies to assess the impact of the seminar will be devised and conducted as an integral part of the total program. The extent of these studies will be limited by the budget. However, additional sources of support for more extensive studies will be sought elsewhere.

Seminar Content

The actual details and content of the seminar will be developed during the planning period of March, April, and May, 1969. However, preliminary considerations seem to warrant the inclusion of certain ideas and the use of actual classroom situations. In the latter, participants would teach using instructional materials they have devised. Feedback from the trial teaching could be analyzed to improve the materials. In effect, this sequence would be a small scale curriculum development. A possible and highly tentative seminar schedule and content outline is attached as Appendix B of this proposal.

APPENDIX D (cont.)

Tentative Outline

Seminar in Design and Development of
Science Instructional Materials

Week	Topic
1-2	Philosophy of Science Education A. Nature of science B. Purposes and objectives of science education
2-3	Devising Science Instructional Materials A. Nature of learner B. Production of software C. Package concept D. Modes of instruction E. Instructional technology F. Evaluation process
4-5	Fabrication of a Science Instructional Unit A. Objectives B. Production of software C. Logistics of hardware D. Feasibility study
6-7	Trial Teaching of Science Instructional Unit A. In climate A (suburban) B. In climate B (central city) C. Feedback seminar (based on classroom observations and to include video tape, audio tape, interaction anaylsis)
8	Synthesis of Experience A. Evaluation outcomes of science instructional materials devised and used. B. Write criteria for science instructional materials. C. Write criteria for teaching new science instructional materials.

APPENDIX D (cont.)

D. Write criteria for trial teaching and subsequent feedback for modifying materials.
E. Evaluate group experience.

APPENDIX E

RECRUITING LETTER

EDUCATIONAL RESEARCH COUNCIL
OF AMERICA

ROCKEFELLER BUILDING · CLEVELAND, OHIO 44113 · TELEPHONE (216) 696-8222

ERC Science Program
TED F. ANDREWS, Director of Science

MEMORANDUM

April 25, 1969

TO: Cleveland Area Principals of Junior High and Middle Schools

FROM: Victor M. Showalter, Research Associate, ERC Science Department

SUBJECT: Seminar in the Design and Development of Science Instructional Materials

Will you please bring the enclosed announcements to the attention of those science teachers that may be interested.

You will note that the time element is rather short. Therefore, interested individuals should follow up their interest as soon as possible.

The Seminar in the Design and Development of Science Instructional Materials provides an unusual opportunity for a unique experience in professional growth. Your help in directing the announcements to prospective participants will be appreciated.

VMS:nk

Enclosures

EDUCATIONAL RESEARCH COUNCIL
OF AMERICA

ROCKEFELLER BUILDING · CLEVELAND, OHIO 44113 · TELEPHONE (216) 696 8222

ERC Science Program
TED F. ANDREWS, Director of Science

April 25, 1969

SEMINAR IN THE DESIGN AND DEVELOPMENT OF SCIENCE INSTRUCTIONAL MATERIALS

The Science Staff of the Educational Research Council of America announces an unusual opportunity for junior high school science teachers: participation in the Seminar in the Design and Development of Science Instructional Materials.

What can be gained by participating in the Seminar?

The individual participant will learn how to design and develop modern science instructional materials. This skill is more important now than ever before in meeting the changing needs of today's young people.

Ten hours of graduate credit may be earned at The Cleveland State University by participation in the Seminar.

Who can participate in the Seminar?

Any person who has taught science at the junior high school level for one year or more and who has been teaching in the Greater Cleveland Area is eligible for selection.

Final selection of ten participants will be made by the Director of SEMDADSIM with the advice and recommendation of other science educators.

When and where will the Seminar be conducted?

This Seminar will run from June 16 through August 8, 1969. It will meet from 8:30 a.m. to 3:00 p.m., Monday through Friday.

The principal location of activities for the Seminar will be in the Science Department of the Educational Research Council of America, Rockefeller Building, 614 Superior Avenue, N. W., Cleveland, Ohio 44113.

What is the cost of participating in the Seminar?

The John Huntington Fund for Education has provided funds to cover the cost of necessary books and materials as well as tuition fees for individuals enrolled for credit at The Cleveland State University.

What will participants actually do in the Seminar?

Since this program is an innovation in science teacher education, a complete list of activities cannot be described before the Seminar gets started. However, as presently envisioned, each participant will design an original instructional unit in consultation with experienced curriculum developers. The participant will then field test the unit in two different settings, in regular classrooms, with junior high school students. Results of the field test will then be used as a basis for revision of the unit.

How does one find out more about the Seminar and/or make an application?

Write or telephone: Dr. Victor M. Showalter, Research Associate
Science Department
Educational Research Council of America
Rockefeller Building
Cleveland, Ohio 44113
696-8222, extension 267
(After 5:00 p.m.: 871-7931)

If you want to make application, please fill out the enclosed form and return it in the self-addressed envelope. All applications should be postmarked on or before May 17, 1969. Final selections will be made and applicants notified on or before May 26, 1969.

VMS:nk

Enclosures

SEMINAR IN THE DESIGN AND DEVELOPMENT OF
SCIENCE INSTRUCTIONAL MATERIALS

at the

Educational Research Council of America
Rockefeller Building
614 Superior Avenue, N. W.
Cleveland, Ohio 44113

APPLICATION

NAME: ____

HOME ADDRESS: ____________________________________

____

HOME TELEPHONE: __________________ SCHOOL TELEPHONE: __________

SCHOOL NAME AND ADDRESS: __________________________

____

____

Junior High School Teaching Experience:

Other Information That Will Support Your Application:

Return to: Dr. Victor M. Showalter, Science Department, Educational Research Council of America, no later than May 17, 1969.

VMS:nk
4/25/69

APPENDIX F

Participant Responses to:

"What Were Your General Reactions to the Seminar?"

Participant A

I have benefited through the interaction with other members of the Seminar. I think I have gained a little more patience which I can take to my classroom this September. I have been exposed to many forms of teaching techniques which I can take back. The available materials from here and other sources will help me in my teaching and helping other teachers.

I would strongly recommend that as many teachers as possible be exposed to this type of experience. I like the freedom of action allowed me here. It is much different from regular classroom courses.

Participant B

(a) Staff- A very fine group of people who will assist you in any way possible. The entire staff welcomes you with a warmth that's very hard to describe.
(b) Seminar- Serves a favorable purpose in trying to meet the demands of a changing society.
(c) Purpose-not too clearly defined!
(d) Wide Range of Teachers - Excellent idea for interaction of varying problems in different settings.

Participant C

Some confusion on my part as to the overall purpose. It will benefit us, but what will ERC do with results still remains a mystery as far as I am concerned.

Another exposure to the purposes and nature of science teaching recharges you even down to defending your philosophy, or type of teaching.

Appendix F (con't)

Participant C (con't)

The materials developed here and the work involved reinforces the feeling that good materials are difficult to develop between 4p.m. and 6 p.m. after a day of teaching. Time/talent/materials are needed. Maybe more systems should work with "National Programs" and change them rather than writing original materials.

Your examples of "science toys," "games," uses and places of field trips serve as sources for future development.

Would I do it again? Something like this - Yes. Would I recommend? Yes.

Participant D

I feel that the seminar has been both interesting and valuable to me personally as a unique learning experience. Professionally, I feel I have acquired some new attitudes toward learning in general and science learning in particular. I found the lecture series very stimulating and I enjoyed and profited from the interaction with the other participants. I especially enjoyed the openness of ideas and variance of opinions that were shared by the staff and group. I found working on an instructional unit to be an interesting challenge and learned a great deal from actually testing it in the two different situations. One of the most profitable experiences of the Seminar was to me the evaluation on tape and in discussion of our field trials. I feel I now better understand the nature of the learning process by actually viewing my own interaction with the children and observing at close range their individual modes of learning. I've learned too that the approach to learning must be adapted to individuals and circumstances, but I feel that any child, given the right motivation or inspiration, can of himself make great strides in learning.

Participant E

This did a lot for me in that it helped greatly in the organization of my own mind on the teaching and developing of science materials. I had a lot of loose ends which I feel were brought together in the last 8 weeks.

Appendix F (con't)

Participant E (con't)

One thing which made the Seminar a great success was that it was free and easy going - people discussing their thoughts, no worry of tests or term papers, taking a course which had a lot of meaning and was relevant to me, no grades to worry about, and having people who actually write instructional materials to talk with.

Participant F

This Seminar proved to be not only challenging but rewarding as well. Since I have a self-contained classroom, little time was devoted to the preparation and teaching of science. Attending a few workshops, on the science texts which are used in our school,never seemed to spark a great interest. Eight weeks of this Seminar taught me so much. Being with scientists who know how and what to teach and why has given me the incentive to change my way of teaching. The teachers who participated in this Seminar have taught me a great deal. Our discussions led to many points of interest. Something new was learned every day.

The attitude of all ERC people helped to make these weeks worthwhile.

Participant G

(1) A different view on the objectives of science teaching.
(2) Refreshing support on student oriented class behavior.
(3) Valuable introduction to the different texts and programs available.
(4) Enlightening field trips.

Participant H

(a) Exchange of idea through teacher-student and student -student relationships.
(b) Exposure to different teaching conditions in the State of Ohio (Hayes vs Antioch).
(c) Exposure to new instructional materials some of which are utilized in the development of our unit.

Appendix F (con't)

Participant H (con't)

(d) The field trips were an excellent addition. The Seminar was in general very helpful. I can truthfully say that my method of teaching in September will differ greatly from those used last school term.